

The Construction of MGM Springfield: Spending, Employment, and Economic Impacts

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Executive Summary

The UMass Donahue Institute ([UMDI](#)) is a member of the Social and Economic Impacts of Gambling in Massachusetts ([SEIGMA](#)) research team charged with carrying out aspects of the research agenda of the Massachusetts Gaming Commission (MGC). This report seeks to inform stakeholders about the construction of the MGM Springfield casino and its economic impacts in the Commonwealth. Over the course of the casino’s construction, UMDI worked with the Massachusetts Gaming Commission and MGM Springfield to obtain data on the spending, employment, and wages related to the construction of MGM Springfield. These data are summarized here along with an estimate of the total economic impacts to the Commonwealth of Massachusetts resulting from the casino construction. See *Appendix 4: Note on the Data Vintage Used in This Study* for a discussion of the data snapshot used in this report.

MGM Resorts International spent \$573.3 million to build the MGM Springfield casino. This amount differs from the larger amount that is commonly reported in the press. The larger amount represents total investment of which construction is a component. The difference between investment and construction includes design fees; furniture, fixtures, and equipment (FF&E); operating supplies and equipment (OSE); license/application fees; and pre-opening expenses.

Where were the construction dollars spent?

- Two-thirds of the construction budget (\$373.8M of \$573.3M) went to firms based in Massachusetts. Half of that (\$194.3M) (or a third of the total) remained in Hampden County.
- Nearly \$85 million went to firms based in the City of Springfield.
- Of the remaining third that went out of state (\$199.5M), about half went to firms in nearby Connecticut with the remainder spread across 16 other states and Canada.
- About one-third of the total contract value went to firms that met at least one element of the diversity criteria.

Table 1: Construction Contract Payments by MA County and Out of State (\$M)

| Massachusetts County | Payment Value | Payment Share of Total Construction Budget |
|------------------------------|----------------|--|
| Barnstable, Dukes, Nantucket | \$0 | 0% |
| Berkshire County | \$0.2 | <0.5% |
| Bristol County | \$17.4 | 3% |
| Essex County | \$11.0 | 2% |
| Franklin County | \$0.1 | <0.5% |
| Hampden County | \$194.3 | 34% |
| Hampshire County | \$2.3 | <0.5% |
| Middlesex County | \$26.3 | 5% |
| Norfolk County | \$2.4 | <0.5% |
| Plymouth County | \$1.3 | <0.5% |
| Suffolk County | \$63.9 | 11% |
| Worcester County | \$54.5 | 10% |
| MA Total | \$373.8 | 65% |
| Out of State | \$199.5 | 35% |
| Total | \$573.3 | 100% |

Source: MGM Springfield and UMDI calculations

Table 2: Summary of Contractor Diversity

| Diversity Category | Amount | Share |
|--|--------|-------|
| Woman-, Minority-, or Veteran-Owned Business | \$204 | 36% |
| Did Not Meet Diversity Criteria | \$369 | 64% |
| Total | \$573 | 100% |

Source: MGM Springfield and UMDI calculations

Where did construction workers reside and was it a diverse workforce?

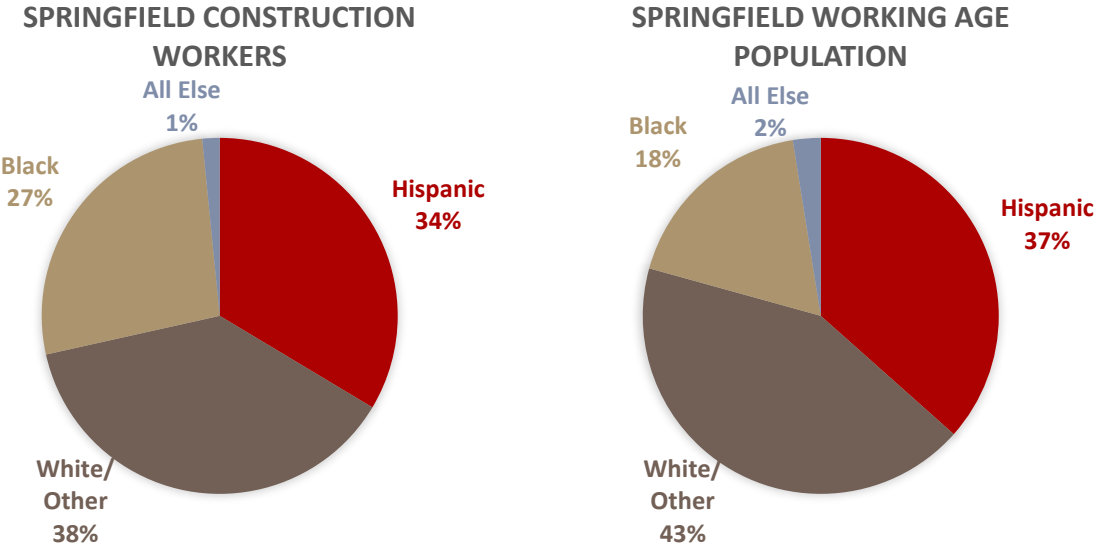
- Over two-thirds (2,963 of 4,249) of the construction workers were Massachusetts residents. Most of the remainder were from Connecticut.
- In total, the most common place of residence was Hampden County, where 36 percent (1,524 of 4,249) of the workers resided. Of this 36 percent, 509 were Springfield residents.
- Workforce diversity statistics suggest that the MGM Springfield construction workforce largely reflected the composition of the populations from which they were drawn.
- One-quarter of Massachusetts-resident construction workers employed during the construction of MGM Springfield were minorities, which is similar to the minority share of the statewide population. Overall, the construction workers were over 90 percent male and non-veteran.
- In Springfield, the population is majority minority. Overall, the shares of White and minority MGM Springfield construction workers from Springfield were similar to their shares of the city's working age population. The largest disparity was with Black construction workers from Springfield who were significantly overrepresented compared to their share of the Springfield population (see Figure 1).

Table 3: Construction Workers by MA County and Out of State

| Massachusetts County | Worker Count | Worker Share of Total |
|----------------------|--------------|-----------------------|
| Barnstable | 2 | 0% |
| Berkshire | 79 | 2% |
| Bristol | 113 | 3% |
| Essex | 135 | 3% |
| Franklin | 111 | 3% |
| Hampden | 1,524 | 36% |
| Hampshire | 292 | 7% |
| Middlesex | 191 | 4% |
| Norfolk | 67 | 2% |
| Plymouth | 77 | 2% |
| Suffolk | 53 | 1% |
| Worcester | 319 | 8% |
| MA Total | 2,963 | 70% |
| Out of State | 1,286 | 30% |
| Total | 4,249 | 100% |

Source: MGM Springfield and UMDI calculations

Figure 1: Race/Ethnicity of MGM Springfield Construction Workers in Springfield and Springfield's Working Age Population



Source: MGM Springfield, UMDI calculations, and American Community Survey 5yr 2013-2017

What were the total statewide economic impacts of constructing MGM Springfield?

- Increases in company revenues and employment drive larger changes in the economy, which are estimated using an economic model.
- Overall, total statewide economic activity (also known as output) increased by \$849 million over the five-year construction period.
- Net new economic activity (i.e., value added or gross state product) totaled \$512 million.
- About 1,000 jobs were created or supported by this economic activity. These jobs accrued \$397 million of income.
- When the estimates of total economic impacts are compared to MGM Springfield's expenditures, the results show that every \$2 of construction spending created about \$1 of additional economic activity in Massachusetts and every \$1 of compensation to construction workers created an additional \$1.29 of income to others in Massachusetts.

Table 4: Summary of Statewide Economic Impacts

| Category | Annual Average | Cumulative |
|--|----------------|------------|
| New Economic Activity (incl. MGM Construction) | \$170 | \$849 |
| Net Economic Impact (i.e. Gross State Product) | \$102 | \$512 |
| Employment | 1,050 | N/A |
| Personal Income | \$79 | \$397 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Introduction

The UMass Donahue Institute ([UMDI](#)) is a member of the Social and Economic Impacts of Gambling in Massachusetts ([SEIGMA](#)) project team that has been charged with carrying out aspects of the research agenda of the Massachusetts Gaming Commission (MGC). The MGC's research agenda creates the opportunity to measure the actual economic outcomes of the casino facilities as they are built and carry out operations in the state. This report describes the activities undertaken to construct the Commonwealth's first integrated resort casino—MGM Springfield in downtown Springfield, Massachusetts—and measures the economic impacts generated through this process.

In November of 2011, Governor Deval Patrick signed the Expanded Gaming Act, which allows for the creation of up to three commercial resort-style casinos and one slot parlor.¹ To reduce internal competition among casinos and maximize their potential benefits, the Commonwealth was divided into three regions, shown in Figure 2, with each region able to obtain one casino license. The slot parlor license was not geographically limited. To date, two casino licenses in Regions A and B and the slot parlor license have been awarded as shown in Figure 3. Figure 4 shows the regions selected for the REMI economic impact model used for the SEIGMA analyses. This configuration was chosen because it aligns with the gaming regions and the Commonwealth's existing economic and commuting linkages.

MGM Springfield was the first resort-style casino to open in Massachusetts on August 24, 2018. This followed three years after the opening of Plainridge Park Casino on June 24, 2015, which is the singular slot parlor. Encore Boston Harbor, the final licensed property, held its grand opening on June 23, 2019. The status of the Region C casino license is complicated by the decision of the MGC to not award a license to the only commercial bidder, which hoped to open in Brockton,² and the U.S. District Court ruling invalidating the land in trust granted to the Mashpee Wampanoag tribe for a casino in nearby Taunton.³ The tribe is continuing to pursue various options to regain its land in trust. Should any of these efforts succeed, a potential Region C casino would still be many years in the future.

Recognizing that the introduction of casinos will create both positive and negative social and economic impacts, Section 71 of the Expanded Gaming Act includes a mandate for the Massachusetts Gaming Commission to establish "an annual research agenda."⁴ To facilitate this research, the MGC sought bids through a competitive request for research process in 2012. The SEIGMA research team, based at the [UMass Amherst School of Public Health and Health Sciences](#), was successful in its competitive bid and the project officially began in April 2013.⁵ The role of UMDI in the larger research agenda is to collect data on and measure the economic impacts of the introduction of casinos in Massachusetts.

This report seeks to inform stakeholders about the construction of MGM Springfield and its economic contribution to the Commonwealth. Over the course of construction, UMDI worked with the MGC and MGM to obtain data on the spending, employment, and wages related to the construction of MGM Springfield. These data are presented in this report along with an estimate of the total economic impacts to the Commonwealth of Massachusetts resulting from the construction of the casino.

¹ <http://massgaming.com/about/expanded-gaming-act>.

² <http://massgaming.com/wp-content/uploads/16-025RegionC.pdf>.

³ https://www.gpo.gov/fdsys/pkg/USCOURTS-mad-1_16-cv-10184/pdf/USCOURTS-mad-1_16-cv-10184-0.pdf.

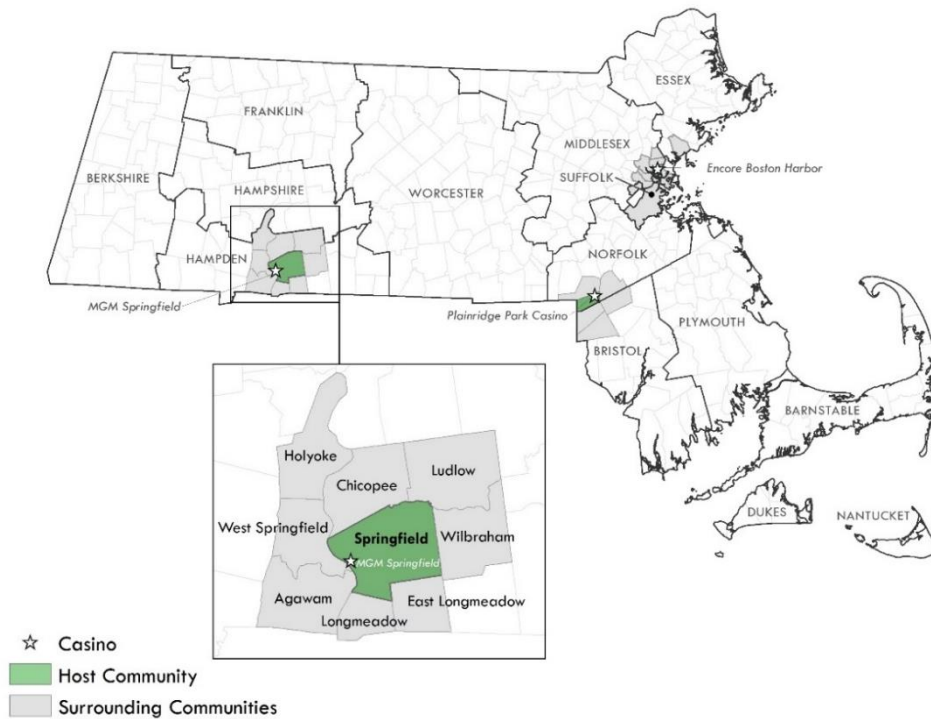
⁴ <http://massgaming.com/about/research-agenda>.

⁵ An overview of the research plan can be found on the MGC's website: <http://massgaming.com/wp-content/uploads/SEIGMA-Research-Plan.pdf>.

Figure 2: Massachusetts Gaming Regions⁶

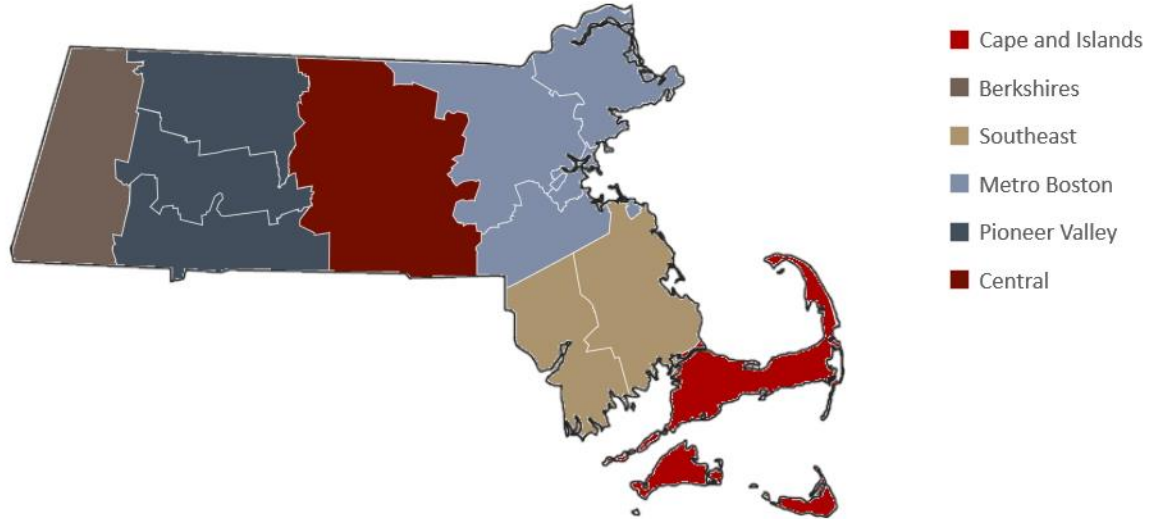


Figure 3: Locations of Approved Massachusetts Casinos and Slot Parlor



⁶ <http://massgaming.com/about/expanded-gaming-act>.

Figure 4: Regional Configuration of SEIGMA’s REMI Model



MGM Springfield is located in downtown Springfield near I-91 and I-291. This site was formerly a collection of commercial buildings that were largely demolished to make way for the casino. A tornado in 2011 had already damaged many of the buildings on the site. Some existing properties were retained either in whole or in part. The completed site contains multiple buildings including the casino/hotel, parking garage, retained buildings on State Street, and the historic armory and church.

The construction of MGM Springfield began in March 2015 and finished prior to the casino’s opening on August 24, 2018.⁷ During this time, a total of \$573 million was spent on construction. This amount differs from the larger amount that is commonly reported in the press. The larger amount represents total investment of which construction is a component. The difference between investment and construction includes design fees; furniture, fixtures, and equipment (FF&E); operating supplies and equipment (OSE); license/application fees; and pre-opening expenses. This total includes money spent on both in-state and out-of-state vendors and labor. The lead contractor, the Boston office of Tishman Construction Corporation, oversaw roughly 90 percent of the project budget while other general contractors oversaw the remaining project components.

For continuity, this report generally mirrors the language and structure of our previous [construction report on Plainridge Park Casino](#).

Glossary for Economic Impact Concepts

In this section, we define terms common to economic modeling and analysis that we utilize in this report. They are as follows:

Employment: Employment is a count of jobs, not people, by place of work. It counts all jobs with the same weight regardless of whether the position is full- or part-time or the labor of a self-employed proprietor. Additionally, jobs are counted as job-years, which are equivalent to one job lasting for one

⁷ <https://mgmspringfield.mgmresorts.com/en/community/project-updates.html>.

year. It is a similar concept to “person-hours.” New jobs often carry over from year to year and therefore the jobs in one year include many of the same jobs as in the previous year. For example, if a new business opens with 10 employees, then the host community of that business will have 10 more jobs than it would have had in every future year that the company maintains its workforce. Over 5 years, the business will have created 50 job-years (10 jobs at the company x 5 years = 50 job-years) though it is possible that it is not the same 10 people who are working there over time. When reviewing changes in employment across multiple years, knowledge of the concept of job-years is vital to proper interpretation.

Output: Output is the total value of production, sales, or business revenues, whether final (i.e., purchased by the end user) or intermediate (i.e., used by another business to produce its own output). It includes the value of inputs to production, wages paid to employees, capital expenses, taxes, and profit. It is useful as an indicator of business activity but, due the inclusion of intermediate purchases, it should not be interpreted as net new economic activity.

Personal Income: Personal income is income and benefits from all sources earned by all persons living in an area. It excludes the income earned by non-resident workers who commute into an area but includes the income of residents who commute out.

Value Added: Value added is the value of all final (i.e., purchased by the end user) goods and services created in an economy. It is net new economic activity and is also known as gross product or net economic impact. It is less than output by the value of all the goods and services that were used in production (i.e., intermediate purchases). Value added provides a useful summary of the economy and is why all nations and US states report their economic growth by using it, calling it either gross domestic product or gross state product as appropriate. Its usefulness derives from the elimination of the double-counting inherent in output, which stems from the inclusion of inputs. Double-counting of inputs can be understood and simplified using an example of making and selling a loaf of bread. A farmer sells wheat to a mill, which then sells flour to a baker, who then sells bread to the final customer. The sale price of the bread includes the cost of all necessary inputs including growing the wheat, milling the flour, and baking the bread. Value added only counts the sale price of the bread to the final consumer, which is the net new value created in the economy. On the other hand, output counts the revenues earned by every business in the supply chain, which means that the value of the wheat and flour are counted more than once. A detailed explanation of value added versus output is available in *Appendix 3: Output versus Value Added*.

Methodology

Overview

The process of assessing economic impacts began with collecting data from MGM Springfield. These data were then prepared for and run through an economic impact model to produce an estimate of the impacts of construction on Massachusetts and its regions. UMDI worked in collaboration with MGM Springfield to ensure that appropriate data were collected from the project’s general contractors and subcontractors. Upon the conclusion of each contract, MGM Springfield collected an audited statement of the contractor’s spending, subcontractors, diversity metrics, and labor. These closeout statements were then provided to UMDI for analysis. In total, this project involved aggregating and analyzing over 200 individual closeout statements.

For this and future economic analyses, the SEIGMA team has chosen the PI+ model from Massachusetts-based Regional Economic Models, Inc. (REMI). PI+ generates realistic year-by-year estimates of the total regional effects of specific initiatives. Model simulations using PI+ allow users to estimate comprehensive economic and demographic effects created by economic events, such as the development and operation of a casino within a region. REMI allows for dynamic, multi-year modeling as compared to other, more simplistic modeling systems. REMI thus has significant advantages for major complex initiatives that: a) have time-series based impacts that are likely to vary over time; b) require the use and interpretation of multiple economic variables; and c) emphasize economic interactions between regions within the state that add up to a true state-level impact.

The REMI model purchased by SEIGMA is a 6-region, 70-sector model. Each of the six regions in the model is built from Massachusetts counties, and the 70 REMI industry sectors roughly correspond to the 3-digit codes of the North American Industry Classification System (NAICS). For the purposes of this study, PI+ used information by region on spending, the number of workers, and wages to produce economic impact estimates. These inputs allow for the appropriate allocation of economic activity across the regions of the Commonwealth. The model can then calculate the total economic impacts for the state and show how activity in one region impacts other regions.

More information on the PI+ model and the methods used to prepare the data for use in the model can be found at the end of this report in *Appendix 1: The PI+ Model* and *Appendix 2: Detailed Data Methodology*.

Data Collection

Early in construction, the Massachusetts Gaming Commission facilitated meetings between MGM, the MGC's construction manager, and the SEIGMA research team to coordinate data collection for this study. For each company contracted by MGM, we requested information about both the company and the workers it used on the project. Information about the company included the company's ZIP code, MGM's payments by month or quarter, the project component contracted, information on subcontractors, and diversity metrics. For the workers, the information included worker pay, hours, place of residence by ZIP code, and diversity metrics.

Each project component (e.g., hotel/podium/armory, garage, etc.) had its own general contractor (GC). MGM's contractual relationships were with and its payments were to the GCs. To complete the project, the GCs hired an assortment of subcontractors to complete various tasks (e.g., hanging drywall, installing fire protection systems, etc.). As a condition of working on the construction of MGM Springfield, MGM's construction managers required both the GCs and all subcontractors to complete an audited closeout statement that captured the SEIGMA team's data requests. Upon completion, these closeout statements were provided to the SEIGMA research team. See *Appendix 4: Note on the Data Vintage Used in This Study* for a discussion of the data snapshot used in this report.

Preparation of Data for Economic Impact Analysis

The detail and specificity of the data provided by MGM allowed the modelers to replace some of the default assumptions of the economic model with project-specific information. For example, PI+ includes average wages by industry and region and the typical flows of goods and services among regions. The construction data for MGM included specific information in each of these areas and therefore allowed the use of actual reported data rather than industry and/or regional averages. The averages built into the model are needed in the absence of precise inputs. As previously noted, detailed methodologies of

the PI+ model and the data preparation appear in *Appendix 1: The PI+ Model* and *Appendix 2: Detailed Data Methodology*.

Construction Data

This section presents and summarizes MGM's spending on construction, the location and characteristics of the contractors, and the location and characteristics of the construction workers.

Construction Spending and Contractor Characteristics

MGM Resorts International spent \$573.3 million to build the MGM Springfield casino. This amount differs from the larger amount that is commonly reported in the press. The larger amount represents total investment of which construction is a component. The difference between investment and construction includes design fees; furniture, fixtures, and equipment (FF&E); operating supplies and equipment (OSE); license/application fees; and pre-opening expenses. Examples of some of this additional spending includes hundreds of beds, mattresses, and televisions for the hotel; thousands of slot machines and gaming tables for the casino; and tens of thousands of individual cups, glasses, plates, pots, pans, and sets of cutlery for the restaurants and bars. This study excludes the economic impacts of non-construction expenditures because the equipment is primarily bought on contract from out-of-state manufacturers and wholesalers. Furthermore, most of the other expenditures are either dealt with in other aspects of SEIGMA's work or are inapplicable to the economic impact modeling. Insofar as local companies are being used for service and maintenance or other ongoing activities, their impacts will be captured in the operating impact study that will be completed for MGM Springfield in the future and follows the [operating impact reports completed for Plainridge Park Casino](#).

The construction of MGM Springfield was comprised of several individual projects conducted in parallel. The parking garage was built while foundation work on the casino/hotel was taking place. A church on the site was moved while improvements were being made to buildings on State Street. These individual components and the dollars spent on these components are shown below in Table 5. The names for each component used in this study reflect the naming convention used by MGM Springfield in the data it provided to the SEIGMA research team. We have retained the names and have provided a brief description of each below.

- **Daycare/Church:** The Daycare project involved building a daycare facility available to the community and operated by Head Start. The Church is a separate project that involved moving, renovating, and repurposing a historic Church structure on the site.
- **Offsite Improvements:** This collection of projects involved changes to the infrastructure outside of the MGM Springfield property and are essentially all roadway improvements.
- **Signage:** These are various signage components and include both interior and exterior signage.
- **95 State Fitout, 101 State Exterior Cleaning, and 99 Union Fitout:** This collection of projects included improvements and renovations to retained existing buildings that were integrated into the property.
- **Hotel/Podium/Armory:** This collection of projects represents the construction of the entire casino/hotel/conference/retail building that most would imagine when thinking of MGM Springfield. It also includes improvements and renovations to the existing armory building.
- **Enabling:** This heading contains many diverse activities that together enable the construction activity including demolition, utility upgrades, surveying, site security, and so on.
- **Garage:** This project includes all relevant construction activity to complete the onsite parking structure.

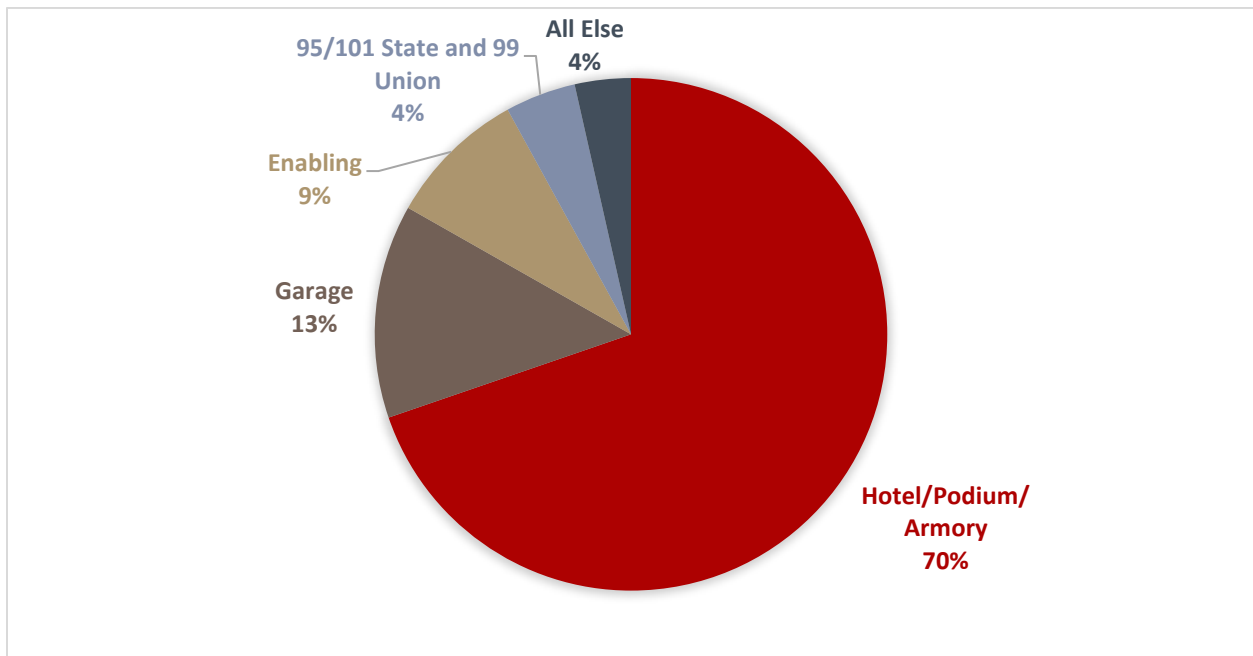
Table 5: Project Components and Spending

| Project Components | Spending |
|---|----------------|
| Hotel/Podium/Armory | \$399.8 |
| Garage | \$77.3 |
| Enabling | \$50.4 |
| 95 State Fitout, 101 State Exterior Cleaning, and 99 Union Fitout | \$25.6 |
| Offsite Improvements | \$9.8 |
| Daycare/Church | \$7.5 |
| Signage | \$3.0 |
| Total | \$573.3 |

Source: MGM Springfield and UMDI calculations

As the project descriptions would suggest, Hotel/Podium/Armory is the largest single budget item comprising over two-thirds of the \$573 million total budget (nearly \$400 million). The Garage and Enabling together are nearly \$128 million and comprise most of the remaining spending. The top three project components in total represent 93 percent of total spending.

Figure 5: Construction Spending by Component⁸



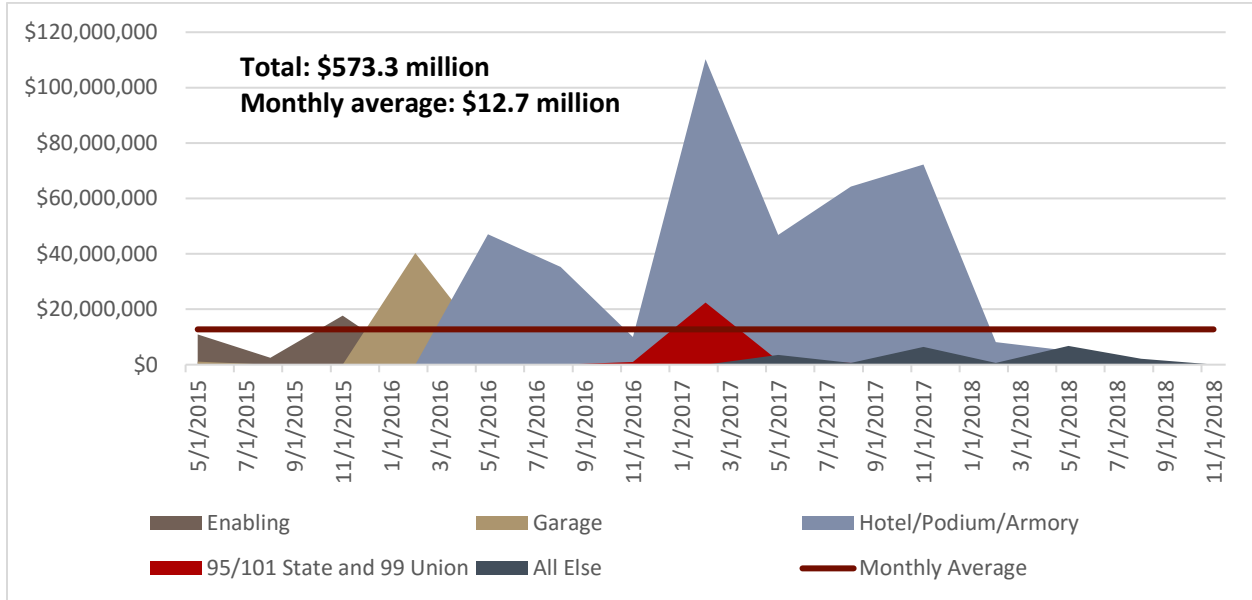
Source: MGM Springfield and UMDI calculations

Construction started gradually and was initially comprised mostly of Enabling to ready the site for primary construction. The Garage and preliminary work on the main casino building followed. As work was almost completed on the Garage, the bulk of the activity shifted to the Hotel/Podium/Armory and

⁸ "All Else" includes Daycare/Church, Offsite Improvements, and Signage.

the buildings on State Street. The total \$573 million budget was spent over 45 months resulting in an average monthly spend of \$12.7 million.

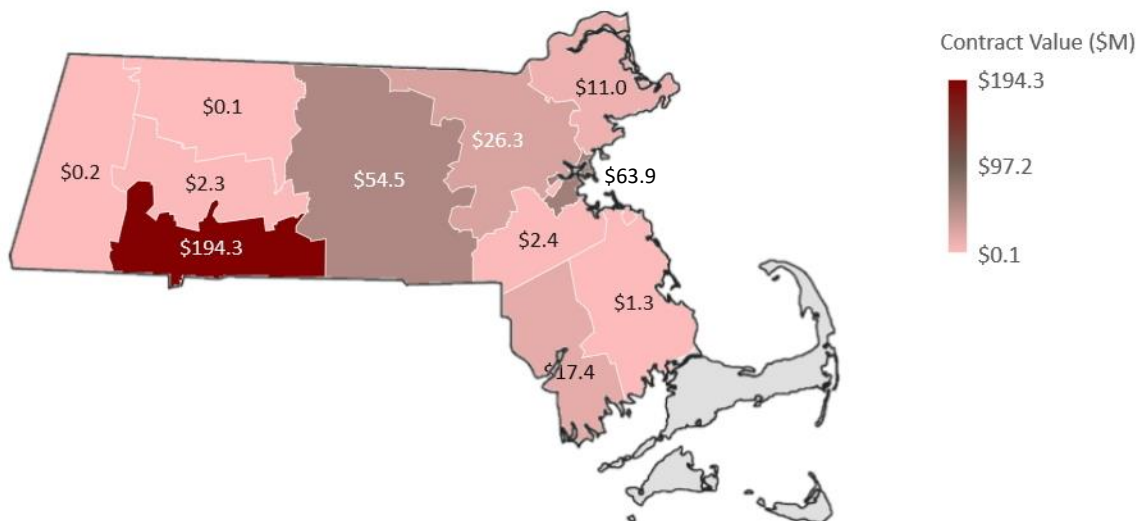
Figure 6: Timeline of Spending by Month and Component



Source: MGM Springfield and UMDI calculations

Overall, two-thirds of all construction spending was awarded to companies in Massachusetts (\$373.8 million). Within the Commonwealth, roughly half of the contract amount was in Hampden County (\$194.3 million). Companies in 13 other counties won the remaining 48 percent of Massachusetts contracts by value, though the drop-off is steep: Suffolk County has the next highest value of contracts at \$63.9 million. There were no construction contracts awarded to companies in the Cape and Islands.

Figure 7: Total Contract Values by Massachusetts County



Source: MGM Springfield and UMDI calculations

Taking a closer look at the MGC-designated host and surrounding communities (H&SC), most of the Hampden County spending remained within the H&SC. Of the \$194.3 million going to companies in Hampden County, \$176.4 million went to companies in these communities with nearly \$85 million going to Springfield companies. Overall, 31 percent of the total construction budget went to companies in the H&SC, which is equivalent to 47 percent of the amount awarded to Massachusetts-based companies.

Figure 8: Total Contract Values by ZIP Code in Host and Surrounding Communities

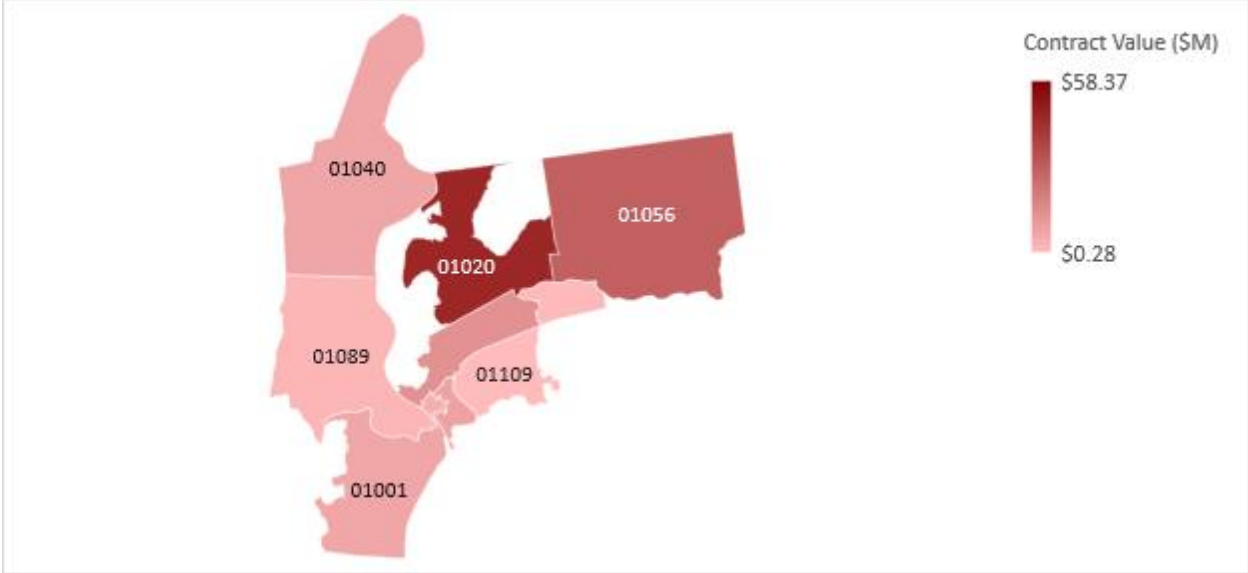


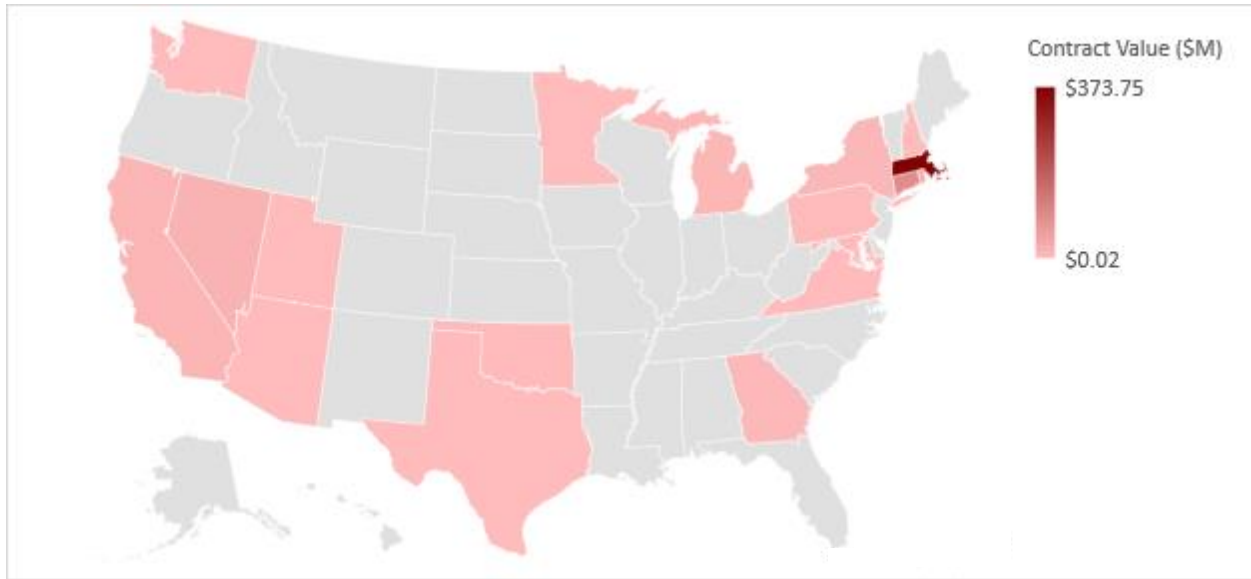
Table 6: Total Contract Values by ZIP Code in Host and Surrounding Communities

| Row Labels | Contract Value (\$M) |
|-------------------------|----------------------|
| Agawam | \$6.9 |
| 01001 | \$6.9 |
| Chicopee | \$46.5 |
| 01020 | \$46.5 |
| Holyoke | \$7.1 |
| 01040 | \$7.1 |
| Ludlow | \$28.4 |
| 01056 | \$28.4 |
| Springfield | \$84.9 |
| 01101 | \$13.4 |
| 01103 | \$4.1 |
| 01104 | \$58.4 |
| 01105 | \$7.9 |
| 01109 | \$0.3 |
| 01151 | \$1.0 |
| West Springfield | \$2.7 |
| 01089 | \$2.3 |
| 01090 | \$0.4 |
| Total H&SC | \$176.4 |

Source: MGM Springfield and UMDI calculations

While two-thirds of the construction value was awarded to companies in Massachusetts, the remaining third went out-of-state. All but \$12 million remained in the U.S. Although Figure 9 shows contracts distributed around the country, most of them are relatively small. After Massachusetts, Connecticut was the state with next highest value of construction contracts for MGM Springfield, though it only received \$93.6 million (i.e., a quarter of the value going to Massachusetts companies). Together, companies in Massachusetts and Connecticut won 82 percent of all construction contracts by value.

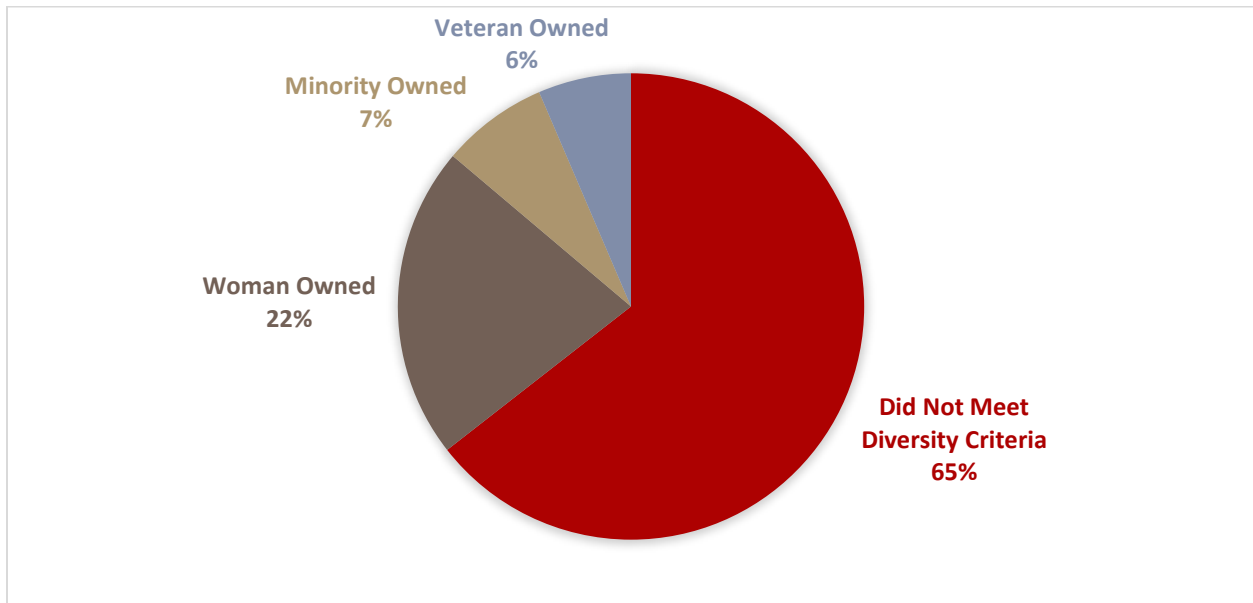
Figure 9: Total Contract Values by State



Source: MGM Springfield and UMDI calculations

In addition to data on the location of companies, the timeline of their payments, and project components, MGM collected data on the diversity criteria of each general contractor and subcontractor. These criteria are limited to the ownership of the companies themselves, which count women-, minority-, and veteran-owned business enterprises (WBE, MBE, and VBE, respectively). The demographic characteristics of their workers were collected separately and are presented later in this report. Just over one-third of the total construction budget was awarded to companies that met at least one of the diversity criteria. This was led by WBEs, with 22 percent (\$124.5 million) of the construction budget. MBEs and VBEs were seven and six percent (\$42.4 million and \$36.9 million) of the construction budget, respectively.

Figure 10: Contract Value by Company Diversity Criteria⁹



Source: MGM Springfield and UMDI calculations

Employment, Compensation, and Worker Characteristics

Over 200 individual contracts were issued during the construction of MGM Springfield. Each company in turn hired workers to carry out its obligations. In total, 5,686 workers were listed in the closeout statements provided to the SEIGMA research team by MGM. Due to some companies being awarded multiple contracts, we estimate that 4,249 individuals worked on MGM Springfield construction.

These workers cumulatively worked 2.6 million hours. Due to the nature of construction, the typical worker is not on-site for the complete duration of the build. For instance, trade workers cycle in and out as their specific expertise is required. Therefore, we do not expect to see large average hours worked per worker. For this project, the average hours per worker is 612 hours or just over 15 forty-hour weeks. When converted to full-time equivalents, the total hours worked results in 1,251 FTEs.¹⁰

The companies that were awarded contracts compensated their workers nearly \$173 million. Total compensation differs from wages in that total compensation considers the value of both wage or salary and benefits (i.e., paid time off, health care, and retirement benefits). The average worker received roughly \$40,700 in total compensation at an average hourly rate of \$66.48 per hour. We found that workers residing in Springfield or the surrounding communities worked more hours and thus earned higher average compensation than the overall average. The higher compensation was driven by higher hours rather than higher hourly compensation rates. This finding aligns with the logic that those closest

⁹ The share of diverse companies in this chart differs by one percent from the value shown in Table 2 because of the combination of categories and the resultant rounding in the chart. The actual calculated value of companies that did not meet the diversity criteria is 64.45 percent.

¹⁰ A full-time equivalent is the number of workers that would be needed if each worker had a full-time, full-year schedule. It is obtained by dividing total hours worked by 2,080—the number of hours in a 40-hour per week, 52-week schedule.

to the construction site worked the most and those coming from farthest away are likely to have specialized knowledge and skills supporting higher pay.

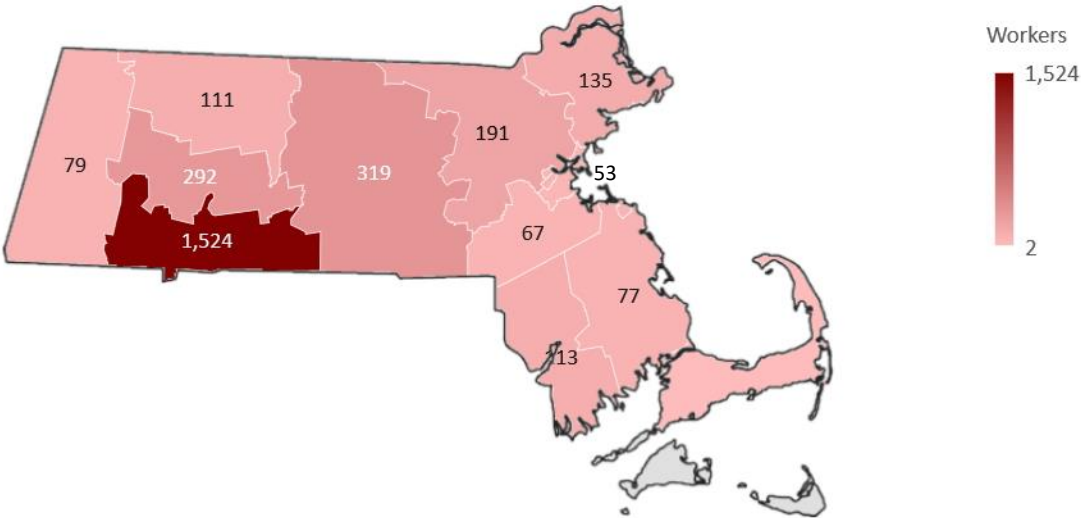
Table 7: Average Hours and Compensation for Springfield and Surrounding Communities

| Geography | Average Hours | Average Compensation | Average Hourly Comp. |
|-------------------------|---------------|----------------------|----------------------|
| Springfield | 833 | \$46,665 | \$56.06 |
| Surrounding Communities | 770 | \$47,718 | \$61.98 |
| All Workers | 612 | \$40,713 | \$66.48 |

Source: MGM Springfield and UMDI calculations

Of the 4,249 individuals counted in the closeout statements, 2,963 or 70 percent are in Massachusetts. Within the Commonwealth, over half (1,524 or 51 percent) reside in Hampden County. The number of workers residing in Hampden County is considerably higher than the 319 workers who reside in Worcester County—the next largest provider of workers in Massachusetts. Of the total worker count, Hampden County provided 36 percent of the workers.

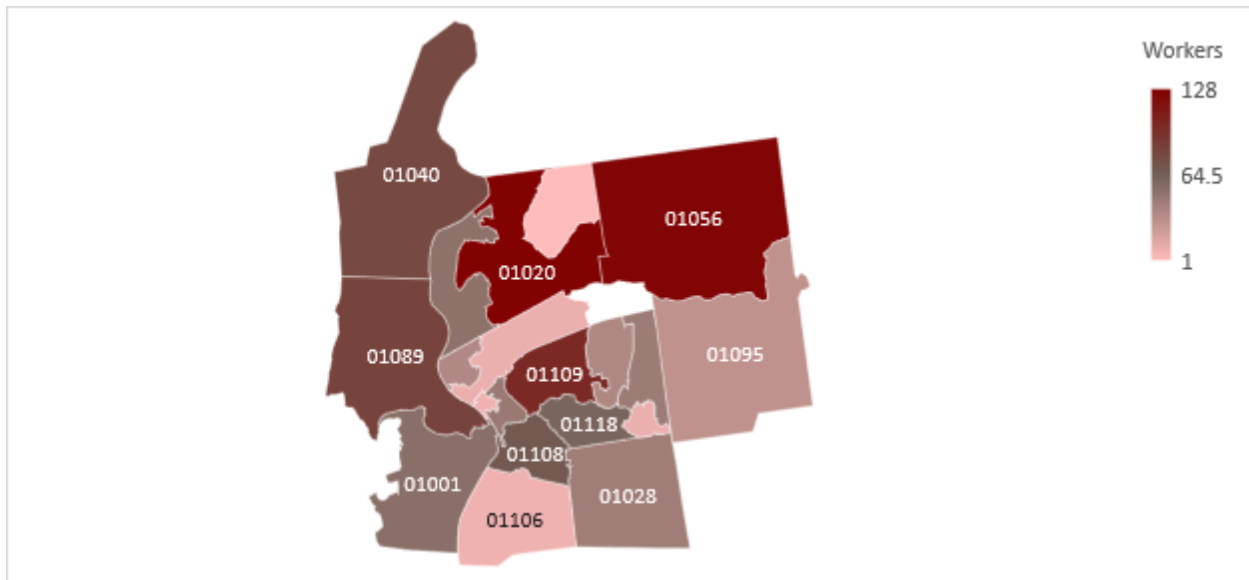
Figure 11: Count of Workers by Massachusetts County



Source: MGM Springfield and UMDI calculations

Of the 1,524 workers who reside in Hampden County, 1,120 (73 percent) reside in the H&SC compared to 91 percent of Hampden County’s contract values going to the H&SC. This means that the workers are more widely distributed across the region and state than the companies that employ them. Within the H&SC, 45 percent or 759 workers reside in the various ZIP codes of Springfield.

Figure 12: Count of Workers by ZIP Code in Host and Surrounding Communities



Source: MGM Springfield and UMDI calculations

Table 8: Count of Workers by ZIP Code in Host and Surrounding Communities

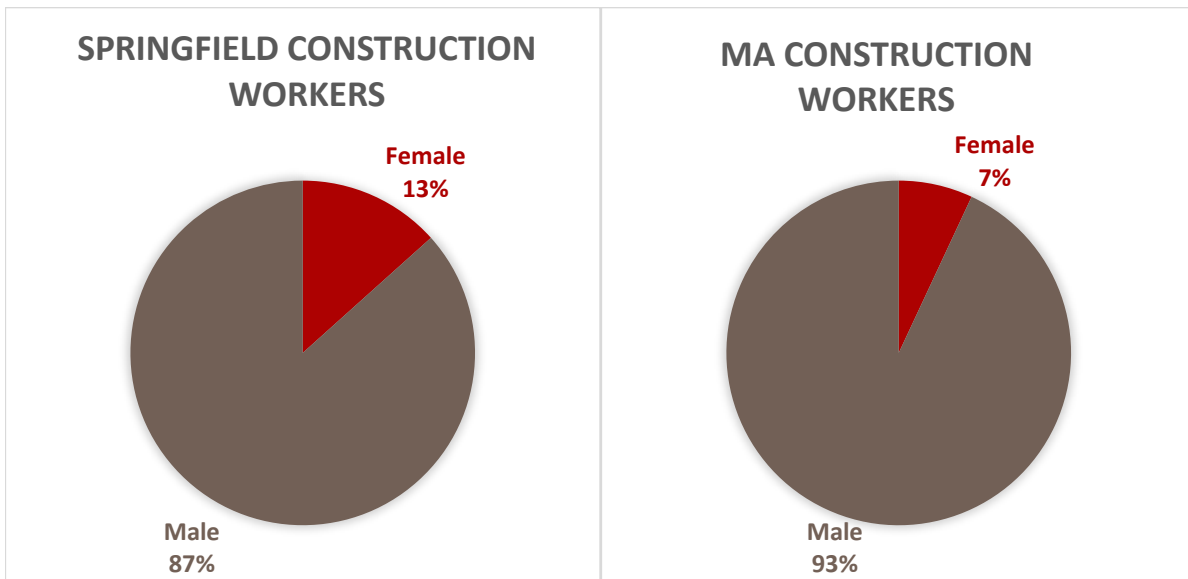
| City/Town/ZIP | Count of Workers |
|------------------------|------------------|
| Agawam | 54 |
| 01001 | 54 |
| Chicopee | 185 |
| 01013 | 52 |
| 01014 | 1 |
| 01020 | 128 |
| 01021 | 2 |
| 01022 | 2 |
| East Longmeadow | 44 |
| 01028 | 44 |
| Holyoke | 81 |
| 01040 | 79 |
| 01041 | 2 |
| Longmeadow | 8 |
| 01106 | 8 |
| Ludlow | 125 |
| 01056 | 125 |
| Springfield | 509 |
| 01023 | 1 |
| 01101 | 10 |
| 01103 | 8 |

| City/Town/ZIP | Count of Workers |
|-------------------------|------------------|
| 01104 | 77 |
| 01105 | 47 |
| 01107 | 36 |
| 01108 | 69 |
| 01109 | 101 |
| 01115 | 1 |
| 01118 | 61 |
| 01119 | 37 |
| 01128 | 10 |
| 01129 | 45 |
| 01138 | 2 |
| 01139 | 2 |
| 06541 | 1 |
| 11119 | 1 |
| West Springfield | 84 |
| 01089 | 83 |
| 01090 | 1 |
| Wilbraham | 30 |
| 01095 | 30 |
| Total H&SC | 1,120 |

Source: MGM Springfield and UMDI calculations

In addition to the location of workers, MGM Springfield collected various demographic characteristics on all construction workers. Females represented six percent of the construction workers employed by MGM Springfield’s contractors. Though low, this finding to some extent reflects the ongoing low share of women in construction occupations, which nationally is also in the single digits.¹¹ Massachusetts resident workers were seven percent female with Springfield-based workers almost twice as likely to be female at 13 percent. The share of women among workers in the surrounding communities is similar to the statewide value.

Figure 13: Share of MGM Springfield Construction Workers by Gender for Springfield and Massachusetts



Source: MGM Springfield and UMDI Calculations

The share of workers by veteran status shows that most workers were not veterans. That is also the case with the population at large. For all Massachusetts-based workers, six percent were veterans. The share of veterans jumps to 11 percent of Springfield residents. As with the data on gender, the composition of the surrounding communities is similar to that of the state.

¹¹ See *Employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity* from the Current Population Survey <https://www.bls.gov/cps/cpsaat11.htm>.

Figure 14: Share of MGM Springfield Construction Workers by Veteran Status for Springfield and Massachusetts



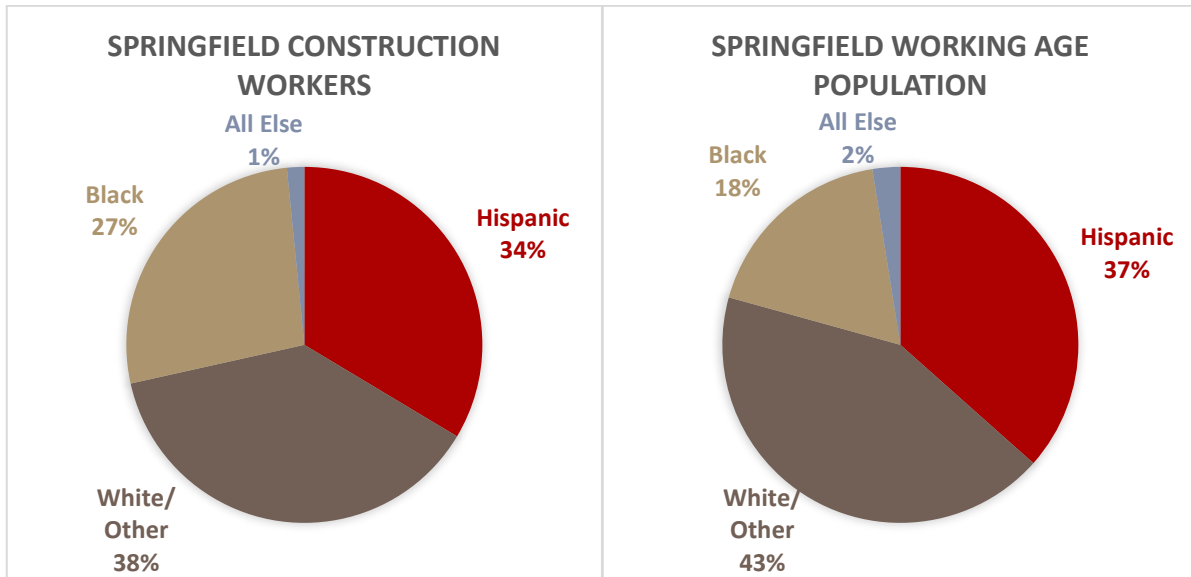
Source: MGM Springfield and UMDI Calculations

Finally, we examined the data on workers by race and ethnicity. In this data, workers chose one option that they most identified with: White/Other, Hispanic, Black, Asian, and American Indian/Native American. Overall, we found that the race/ethnicity mix of workers closely resembled that of the working age populations from which they were drawn. Statewide, three-quarters of all MGM Springfield construction workers identified as White/Other, 17 percent Hispanic, and seven percent Black. Asian and American Indian/Native American together were just over one percent. All of those shares are within one percent of the statewide working age population. The largest disparity between the working age population and MGM Springfield construction workers was found in the surrounding communities where 75 percent of the working age population is White/Other compared to 82 percent of MGM Springfield construction workers.

The workers drawn from Springfield were more likely to be minority than those from either the state or the surrounding communities: 38 percent White/Other, 34 percent Hispanic, 27 percent Black, and one percent “All Else.” When placed in the context of Springfield’s working age population, the share of White/Other MGM Springfield construction workers from Springfield is smaller than their share of the population of Springfield: 38 percent of construction workers compared to 43 percent of the working age population. The largest difference in Springfield is in the share of individuals who identify as Black. Twenty-seven percent of MGM Springfield construction workers from Springfield identified as Black compared to 18 percent of Springfield’s working age population identifying as Black.¹²

¹²An effort to compare the share of MGM Springfield construction workers to only those in construction occupations was hampered by exceedingly large margins of error in the source data.

Figure 15: Race/Ethnicity of MGM Springfield Construction Workers in Springfield and Springfield's Working Age Population¹³



Source: MGM Springfield, UMDI calculations, and American Community Survey 5yr 2013-2017

Economic Impacts of Construction

The following pages describe the direct connections between the activities at the MGM Springfield construction site and the regions of the state. The companies and workers who are active participants in the economic activities associated with building the casino characterize these direct impacts. However, the total economic impacts of construction extend beyond these direct activities. Each company hired to work on the site has its own suppliers and vendors who gain business by virtue of their customers being busier. Every worker that receives a paycheck returns back home to his or her neighborhood. These dollars are spent on housing, entertainment, education, and so on. These interactions, called indirect and induced effects, also create economic impacts attributable to the casino that, together with the direct effects, describe the total economic impacts. A glossary of economic impact terms is provided on page 3 of this report. For modeling purposes, the 14 counties of Massachusetts were combined into six regions as shown in Table 9.

¹³ The U.S. Census considers Hispanic to be an ethnicity rather than a race. As a result, one can be white and Hispanic or black and Hispanic. For groups other than Hispanic, this chart only counts those who claimed no Hispanic heritage. Similarly, anyone of any race claiming Hispanic heritage is counted only as Hispanic. This method avoids double-counting individuals.

Table 9: Regional Configuration of SEIGMA’s REMI PI+ Model

| Model Region | County |
|------------------|------------|
| Berkshires | Berkshire |
| Cape and Islands | Barnstable |
| | Dukes |
| | Nantucket |
| Central | Worcester |
| Metro Boston | Essex |
| | Middlesex |
| | Norfolk |
| | Suffolk |
| Pioneer Valley | Franklin |
| | Hampden |
| | Hampshire |
| Southeast | Bristol |
| | Plymouth |

Summary

The results of the economic modeling found that, statewide, the construction of MGM Springfield created or supported an average of 1,050 jobs per year, peaking at 2,774 in 2017. These totals, shown in Table 10, include employees directly hired to work on the construction of MGM Springfield, as well as individuals hired at downstream suppliers (business-to-business or indirect jobs). An example of a new indirect job is one that is created at the firm providing wires to the electrical contractor.

Table 10 also includes jobs created by these newly-employed workers spending their wages in their home communities (induced jobs). An example of an induced job would include those created at restaurants frequented by new direct and indirect employees. Indirect employment is low in this scenario because Massachusetts imports many of the inputs to construction (e.g. steel, drywall, wiring, etc.) thus creating indirect jobs out-of-state.

Table 10: Direct, Indirect, and Induced Statewide Jobs from MGM Springfield Construction

| Total Employment | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|---|------------|--------------|--------------|------------|-----------|--------------|
| MGM Springfield Construction Workers (Direct) | 189 | 697 | 1,629 | 447 | 1 | 593 |
| Business to Business (Indirect) | 40 | 85 | 145 | 10 | 5 | 57 |
| Total Induced | 133 | 446 | 1,000 | 338 | 83 | 400 |
| <i>Consumption-Based Induced</i> | 77 | 255 | 560 | 134 | 32 | 212 |
| <i>Other Induced</i> | 56 | 191 | 440 | 204 | 51 | 188 |
| Total | 362 | 1,229 | 2,774 | 795 | 89 | 1,050 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Two-thirds of the new jobs resulting from building MGM Springfield were in the construction sector. Most of these were individuals employed in constructing MGM Springfield. However, 13 percent of these jobs were supported by new construction demand caused by marginal increases in the demand for other commercial and residential structures. The rest of the jobs were mainly distributed among

sectors created by the expenditure of new personal income (Retail, Health Care, Accommodation, and Food Services). State and Local Government jobs were supported by general economic growth.

Table 11: Statewide Employment Changes in the Top Five Impacted Sectors

| Impacted Sector | Pioneer Valley Average Employment | Rest of MA Average Employment |
|-----------------------------------|--------------------------------------|----------------------------------|
| Construction | 435 | 257 |
| State and local government | 46 | 25 |
| Retail trade | 35 | 25 |
| Health care and social assistance | 29 | 24 |
| Accommodation and food services | 18 | 16 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

The total new economic activity created by the construction of MGM Springfield is shown in Table 12. The annual average provides a sense of the contributions in a typical year while the cumulative number shows the total new economic activity accruing to each region and the Commonwealth over the five-year analysis period. The budget of \$573 million yielded \$849 million of new business activity in the Commonwealth. On net, after accounting for the value of the goods and services used up in production, the economy of Massachusetts created total new value of \$512 million over five years.

Table 12: New Economic Activity by Region (\$M)

| Region | Total (Output) | | Net New (Value Added) | |
|------------------|----------------|--------------|-----------------------|--------------|
| | Annual Avg. | Cum. | Annual Avg. | Cum. |
| Metro Boston | \$52 | \$259 | \$32 | \$158 |
| Southeast | \$9 | \$47 | \$6 | \$28 |
| Pioneer Valley | \$82 | \$409 | \$49 | \$246 |
| Central | \$23 | \$115 | \$14 | \$69 |
| Berkshires | \$2 | \$12 | \$2 | \$8 |
| Cape and Islands | \$1 | \$6 | \$1 | \$4 |
| MA | \$170 | \$849 | \$102 | \$512 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Note: Totals may not match due to rounding.

Figure 16: Relationship between Summary Statewide Economic Impacts



Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Detailed Results

The summary results presented above provide a snapshot and give a high-level sense of how the construction of MGM Springfield impacted Massachusetts. This section tracks the impacts through the model starting from construction spending to give a better sense of how these various concepts are related.

The best place to start is with the impacts on output (also known as sales or business revenues). It is the simplest way to see how Massachusetts' share of the \$573 million of construction spending rippled across the state and created multiplied impacts. In each case, the cumulative output impacts exceed the direct spending that occurred in each region. The bulk of the new output created in the Pioneer Valley tended to coincide with the location of the construction spending. The Cape and Islands, which were awarded no contracts, still show new output due to intrastate trade and commuting relationships. Overall, \$849 million of new output was created over the construction period. This resulted in every dollar of construction activity creating another \$0.48 of economic activity inside Massachusetts, or every \$2 of construction spending creating about \$1 more of revenues after accounting for out-of-state suppliers and other leakages due to trade and commuting.

Table 13: Total Impacts on Output of MGM Springfield Construction (\$M)

| Output | | 2015 | 2016 | 2017 | 2018 | 2019 | Average | Cum. |
|------------------|--------------|---------------|----------------|----------------|----------------|---------------|----------------|----------------|
| Metro Boston | Direct | \$24.98 | \$40.44 | \$34.86 | \$3.27 | \$0.00 | \$20.7 | \$103.5 |
| | Add'l | \$13.5 | \$35.7 | \$67.0 | \$29.1 | \$10.2 | \$31.1 | \$155.5 |
| | Total | \$38.5 | \$76.2 | \$101.8 | \$32.4 | \$10.2 | \$51.8 | \$259.1 |
| Southeast | Direct | \$0.00 | \$0.00 | \$18.27 | \$0.51 | \$0.00 | \$3.8 | \$18.8 |
| | Add'l | \$0.9 | \$2.6 | \$15.5 | \$6.6 | \$2.5 | \$5.6 | \$28.1 |
| | Total | \$0.9 | \$2.6 | \$33.8 | \$7.1 | \$2.5 | \$9.4 | \$46.9 |
| Pioneer Valley | Direct | \$18.11 | \$54.32 | \$101.73 | \$22.47 | \$0.05 | \$39.3 | \$196.7 |
| | Add'l | \$11.9 | \$43.1 | \$92.0 | \$50.1 | \$15.6 | \$42.5 | \$212.7 |
| | Total | \$30.0 | \$97.5 | \$193.7 | \$72.6 | \$15.6 | \$81.9 | \$409.4 |
| Central | Direct | \$0.00 | \$10.77 | \$42.48 | \$1.27 | \$0.00 | \$10.9 | \$54.5 |
| | Add'l | \$1.1 | \$9.8 | \$33.8 | \$11.7 | \$4.3 | \$12.1 | \$60.6 |
| | Total | \$1.1 | \$20.5 | \$76.2 | \$13.0 | \$4.3 | \$23.0 | \$115.1 |
| Berkshires | Direct | \$0.00 | \$0.00 | \$0.01 | \$0.22 | \$0.00 | \$0.0 | \$0.2 |
| | Add'l | \$0.4 | \$1.4 | \$3.0 | \$5.3 | \$2.1 | \$2.4 | \$12.2 |
| | Total | \$0.4 | \$1.4 | \$3.0 | \$5.5 | \$2.1 | \$2.5 | \$12.4 |
| Cape and Islands | Direct | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.0 | \$0.0 |
| | Add'l | \$0.3 | \$1.0 | \$2.6 | \$1.5 | \$0.7 | \$1.2 | \$6.1 |
| | Total | \$0.3 | \$1.0 | \$2.6 | \$1.5 | \$0.7 | \$1.2 | \$6.1 |
| MA | Direct | \$43.09 | \$105.53 | \$197.35 | \$27.74 | \$0.05 | \$74.8 | \$373.8 |
| | Add'l | \$28.1 | \$93.6 | \$213.8 | \$104.4 | \$35.3 | \$95.1 | \$475.3 |
| | Total | \$71.2 | \$199.1 | \$411.2 | \$132.2 | \$35.4 | \$169.8 | \$849.1 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Note: Totals may not match due to rounding.

Output in turn creates value added, otherwise known as *net* economic impact. Output counts every transaction in the economy, including all business-to-business transactions. As a result, output counts the value of inputs to production more than once resulting in an overestimate of the new value created in an economy. A detailed description of the difference between output and value added is provided in *Appendix 3: Output versus Value Added*. Value added, also called gross product, follows the same general regional trend of output. Cumulative value added is estimated at \$512 million.

Table 14: Total Impacts on Value Added of MGM Springfield Construction (\$M)

| Value-Added | 2015 | 2016 | 2017 | 2018 | 2019 | Average | Cum. |
|--------------------|---------------|----------------|----------------|---------------|---------------|----------------|----------------|
| Metro Boston | \$22.6 | \$45.5 | \$62.4 | \$20.7 | \$6.8 | \$31.6 | \$158.1 |
| Southeast | \$0.5 | \$1.6 | \$20.0 | \$4.4 | \$1.6 | \$5.6 | \$28.1 |
| Pioneer Valley | \$17.8 | \$57.9 | \$115.5 | \$44.7 | \$10.2 | \$49.2 | \$246.0 |
| Central | \$0.7 | \$12.1 | \$45.0 | \$8.1 | \$2.7 | \$13.7 | \$68.5 |
| Berkshires | \$0.2 | \$0.8 | \$1.8 | \$3.4 | \$1.3 | \$1.5 | \$7.5 |
| Cape and Islands | \$0.2 | \$0.6 | \$1.6 | \$1.0 | \$0.4 | \$0.8 | \$3.8 |
| MA | \$42.0 | \$118.6 | \$246.3 | \$82.3 | \$23.0 | \$102.4 | \$512.1 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Note: Totals may not match due to rounding.

To create the economic activity represented by output and value added, labor is needed. Since most of the jobs on-site lasted less than one year, they produced less than the average annual output and compensation of an annualized construction job. Therefore, the employment multiplier is lower than the output multiplier at 1.24, meaning that every job created 0.24 additional jobs. Put another way, for every four jobs at the construction site, one additional job was created elsewhere in Massachusetts. Employment cannot be summed over time, so a cumulative total is not provided. Instead, the annual average gives a better estimate of the total number of jobs that were created or supported by construction.

Table 15: Total Impacts on Employment of MGM Springfield Construction (Job-Years)

| Region | | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|------------------|--------------|------------|--------------|--------------|------------|-----------|--------------|
| Metro Boston | Direct | 29 | 135 | 254 | 28 | 0 | 89 |
| | Add'l | 61 | 141 | 248 | 66 | 18 | 107 |
| | Total | 89 | 277 | 501 | 94 | 18 | 196 |
| Southeast | Direct | 0 | 0 | 164 | 26 | 0 | 38 |
| | Add'l | 6 | 18 | 96 | 20 | 9 | 30 |
| | Total | 6 | 18 | 260 | 46 | 9 | 68 |
| Pioneer Valley | Direct | 160 | 498 | 959 | 309 | 0 | 385 |
| | Add'l | 93 | 294 | 564 | 199 | 39 | 238 |
| | Total | 254 | 792 | 1,523 | 508 | 39 | 623 |
| Central | Direct | 0 | 63 | 249 | 7 | 0 | 64 |
| | Add'l | 8 | 64 | 205 | 38 | 16 | 66 |
| | Total | 8 | 127 | 453 | 45 | 16 | 130 |
| Berkshires | Direct | 0 | 0 | 3 | 76 | 0 | 16 |
| | Add'l | 2 | 7 | 15 | 17 | 4 | 9 |
| | Total | 2 | 7 | 18 | 93 | 4 | 25 |
| Cape and Islands | Direct | 0 | 0 | 0 | 0 | 0 | 0 |
| | Add'l | 2 | 7 | 17 | 8 | 3 | 8 |
| | Total | 3 | 8 | 18 | 8 | 3 | 8 |
| MA | Direct | 189 | 697 | 1,629 | 447 | 1 | 593 |
| | Add'l | 173 | 532 | 1,145 | 348 | 88 | 457 |
| | Total | 362 | 1,229 | 2,774 | 795 | 89 | 1,050 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Note: Totals may not match due to rounding.

Every job, whether on the construction site or created by ripple effects, comes with a paycheck. Not surprisingly, personal income follows employment around the state. Workers in the Pioneer Valley gained a total of \$221 million of new income as a result of the construction of MGM Springfield. The state as a whole gained \$397 million of new income. In total, MGM Springfield contractors paid nearly \$173 million of compensation to all workers, of which \$118 million went to Massachusetts workers. This resulted in a multiplier of 2.29, meaning that every dollar of MGM Springfield construction compensation created an additional \$1.29 of new income in Massachusetts.

Table 16: Total Impacts on Personal Income of MGM Springfield Construction (\$M)

| Region | | 2015 | 2016 | 2017 | 2018 | 2019 | Average | Cum. |
|------------------|--------------|---------------|---------------|----------------|---------------|---------------|---------------|----------------|
| Metro Boston | Direct | \$0.44 | \$2.53 | \$4.60 | \$0.73 | \$0.00 | \$1.7 | \$8.3 |
| | Add'l | \$5.3 | \$16.4 | \$35.2 | \$13.7 | \$6.0 | \$15.3 | \$76.7 |
| | Total | \$5.8 | \$19.0 | \$39.8 | \$14.4 | \$6.0 | \$17.0 | \$85.0 |
| Southeast | Direct | \$0.00 | \$0.00 | \$3.72 | \$0.36 | \$0.00 | \$0.8 | \$4.1 |
| | Add'l | \$0.7 | \$2.3 | \$11.9 | \$4.0 | \$2.1 | \$4.2 | \$21.0 |
| | Total | \$0.7 | \$2.3 | \$15.6 | \$4.3 | \$2.1 | \$5.0 | \$25.1 |
| Pioneer Valley | Direct | \$7.34 | \$22.96 | \$44.40 | \$13.33 | \$0.02 | \$17.6 | \$88.0 |
| | Add'l | \$8.0 | \$27.4 | \$56.6 | \$27.9 | \$12.5 | \$26.5 | \$132.5 |
| | Total | \$15.3 | \$50.4 | \$101.0 | \$41.3 | \$12.6 | \$44.1 | \$220.5 |
| Central | Direct | \$0.00 | \$3.06 | \$12.06 | \$0.36 | \$0.00 | \$3.1 | \$15.5 |
| | Add'l | \$1.0 | \$6.3 | \$19.7 | \$5.6 | \$3.8 | \$7.3 | \$36.4 |
| | Total | \$1.0 | \$9.4 | \$31.8 | \$6.0 | \$3.8 | \$10.4 | \$51.9 |
| Berkshires | Direct | \$0.00 | \$0.00 | \$0.09 | \$2.37 | \$0.00 | \$0.5 | \$2.5 |
| | Add'l | \$0.2 | \$0.7 | \$1.7 | \$4.4 | \$0.9 | \$1.6 | \$8.0 |
| | Total | \$0.2 | \$0.7 | \$1.8 | \$6.8 | \$0.9 | \$2.1 | \$10.4 |
| Cape and Islands | Direct | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.0 | \$0.0 |
| | Add'l | \$0.2 | \$0.6 | \$1.6 | \$0.9 | \$0.4 | \$0.8 | \$3.8 |
| | Total | \$0.2 | \$0.6 | \$1.6 | \$0.9 | \$0.4 | \$0.8 | \$3.8 |
| MA | Direct | \$7.78 | \$28.55 | \$64.87 | \$17.15 | \$0.02 | \$23.7 | \$118.4 |
| | Add'l | \$15.4 | \$53.9 | \$126.7 | \$56.6 | \$25.8 | \$55.7 | \$278.4 |
| | Total | \$23.2 | \$82.4 | \$191.6 | \$73.7 | \$25.9 | \$79.4 | \$396.8 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Note: Totals may not match due to rounding.

Personal income does not tell the whole story of increased buying power. Disposable income is what remains after taxes. Cumulatively, the model predicts new disposable income to be \$325 million or \$72 million less than the cumulative gains in personal income. What is left is available to households to fund their consumption wants and needs.

Table 17: Total Impacts on Disposable Personal Income of MGM Springfield Construction (\$M)

| Region | 2015 | 2016 | 2017 | 2018 | 2019 | Average | Cum. |
|------------------|---------------|---------------|----------------|---------------|---------------|---------------|----------------|
| Metro Boston | \$4.8 | \$15.8 | \$33.3 | \$12.2 | \$5.2 | \$14.3 | \$71.4 |
| Southeast | \$0.6 | \$1.9 | \$12.8 | \$3.7 | \$1.9 | \$4.2 | \$20.8 |
| Pioneer Valley | \$12.3 | \$40.3 | \$80.9 | \$33.6 | \$10.8 | \$35.6 | \$177.8 |
| Central | \$0.8 | \$7.7 | \$26.2 | \$5.1 | \$3.3 | \$8.6 | \$43.0 |
| Berkshires | \$0.2 | \$0.6 | \$1.4 | \$5.5 | \$0.8 | \$1.7 | \$8.5 |
| Cape and Islands | \$0.2 | \$0.5 | \$1.4 | \$0.8 | \$0.4 | \$0.6 | \$3.1 |
| MA | \$18.8 | \$66.8 | \$155.9 | \$60.8 | \$22.3 | \$64.9 | \$324.6 |

Source: MGM Springfield, UMDI calculations, and Regional Economic Models, Inc.

Note: Totals may not match due to rounding.

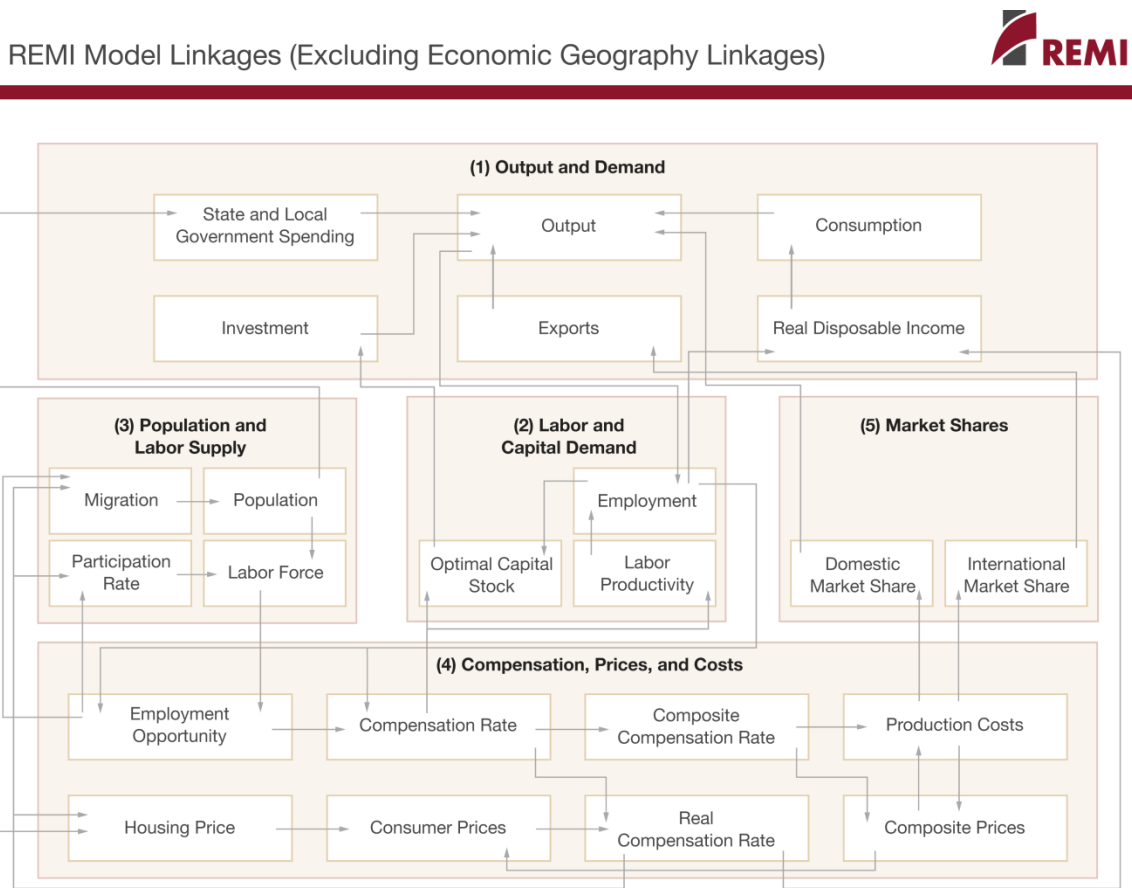
In summary, the construction of MGM Springfield creates total economic impacts that exceed its direct spending and employment impacts in all major regions of Massachusetts. The SEIGMA research team plans to continue to examine the economic impacts of MGM Springfield by gathering data on its operations. This data will enable the future evaluation of vendor and supplier spending and hiring and wages (see previous report completed on [Plainridge Park Casino's operations and its economic impacts](#)). Coupled with the data from the patron survey conducted by the SEIGMA research team (see previous report detailing the [patron survey at Plainridge Park Casino](#)), this analysis would balance the spending and hiring of MGM Springfield with the effects of consumer spending reallocation from other regions of the state to MGM Springfield and downtown Springfield.

Appendix 1: The PI+ Model

PI+ is a structural economic forecasting and policy analysis model. It integrates input-output, computable general equilibrium, econometric, and economic geography methodologies. The model is dynamic, with forecasts and simulations generated on an annual basis and behavioral responses to compensation, price, and other economic factors.

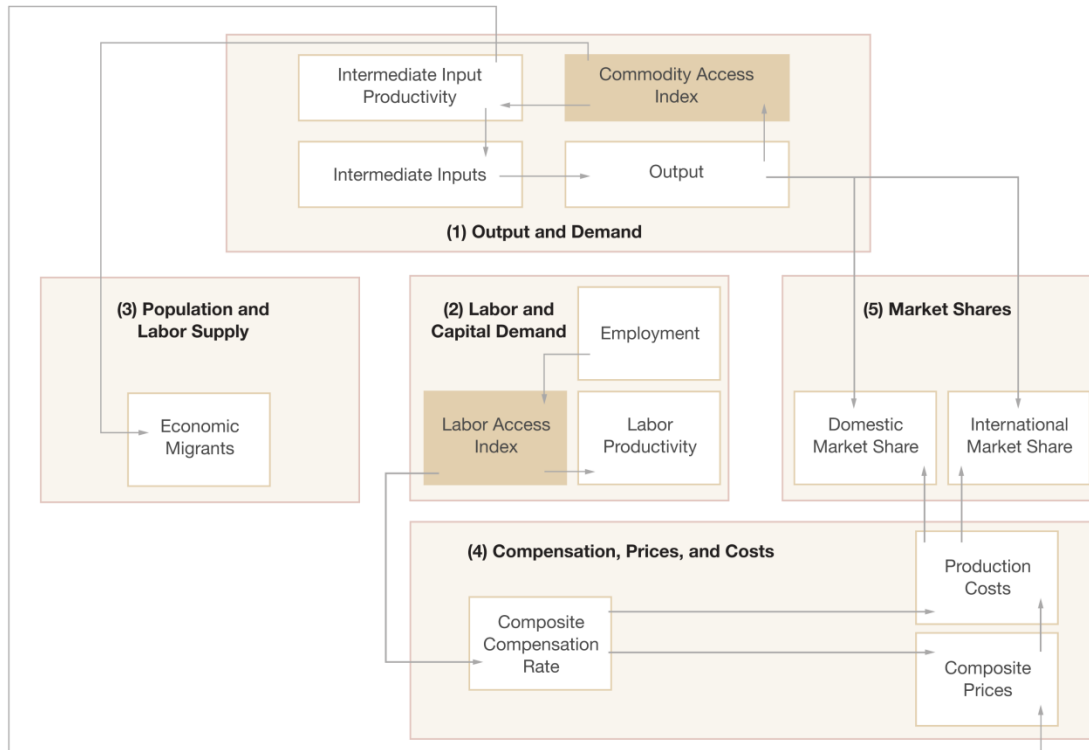
The model consists of thousands of simultaneous equations with a structure that is relatively straightforward. The exact number of equations used varies depending on the extent of industry, demographic, demand, and other detail in the specific model being used. The overall structure of the model can be summarized in five major blocks: (1) Output and Demand, (2) Labor and Capital Demand, (3) Population and Labor Supply, (4) Compensation, Prices, and Costs, and (5) Market Shares. The blocks and their key interactions are shown in Figure 17 and Figure 18.

Figure 17: REMI Model Linkages



Source: Regional Economic Models, Inc.

Figure 18: Economic Geography Linkages



Source: Regional Economic Models, Inc.

The Output and Demand block consists of output, demand, consumption, investment, government spending, exports, and imports, as well as feedback from output change due to the change in the productivity of intermediate inputs. The Labor and Capital Demand block includes labor intensity and productivity as well as demand for labor and capital. Labor force participation rate and migration equations are in the Population and Labor Supply block. The Compensation, Prices, and Costs block includes composite prices, determinants of production costs, the consumption price deflator, housing prices, and the compensation equations. The proportion of local, inter-regional, and export markets captured by each region is included in the Market Shares block.

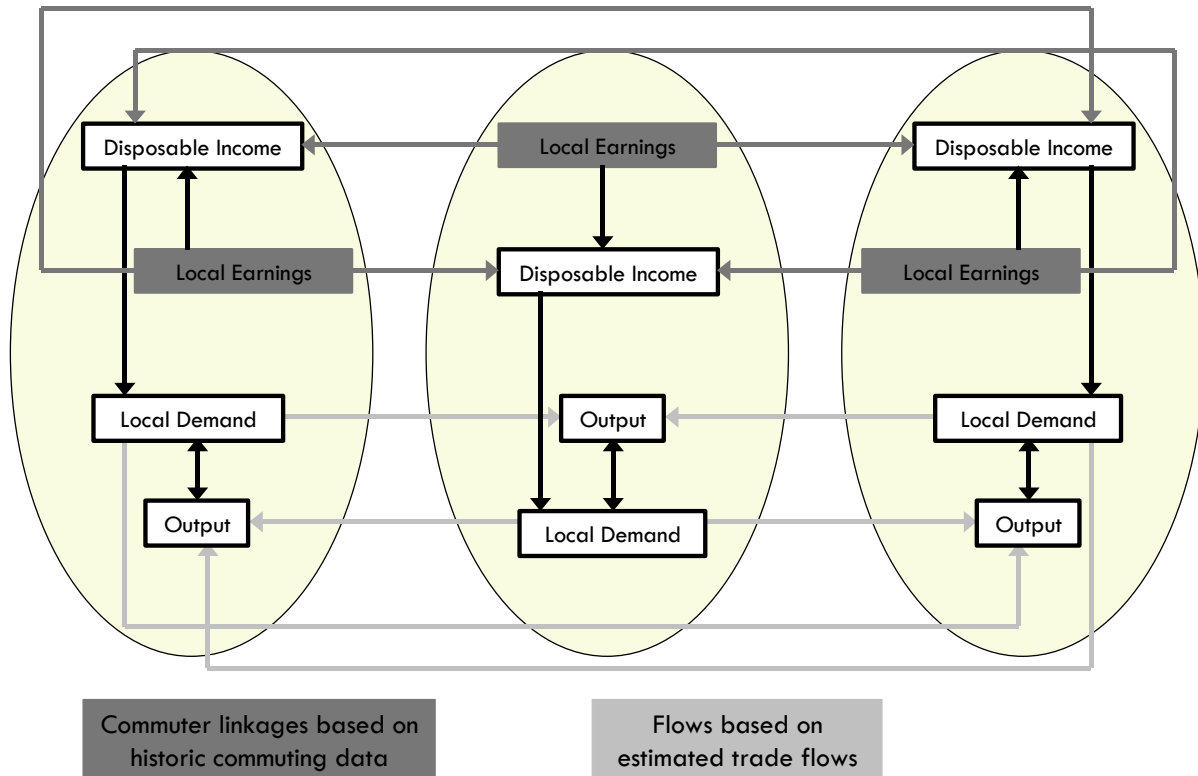
Models can be built as single region, multi-region, or multi-region national models. A region is defined broadly as a sub-national area and could consist of a state, province, county, city, or any combination of sub-national areas.

Single-region models consist of an individual region, called the home region. The rest of the nation is also represented in the model. However, since the home region is only a small part of the total nation, changes in the home region do not have an endogenous effect on the variables in the rest of the nation.

Multi-regional models have interactions among regions, such as trade and commuting flows. These interactions include trade flows from each region to each of the other regions. These flows are illustrated for a three-region model in Figure 19.

Figure 19: Trade and Commuter Flow Linkages

Trade and Commuter Flow Linkages



Source: Regional Economic Models, Inc.

Multiregional national models also include a central bank monetary response that constrains labor markets. Models that only encompass a relatively small portion of a nation are not endogenously constrained by changes in exchange rates or monetary responses.

Block 1. Output and Demand

This block includes output, demand, consumption, investment, government spending, import, commodity access, and export concepts. Output for each industry in the home region is determined by industry demand in all regions in the nation, the home region's share of each market, and international exports from the region.

For each industry, demand is determined by the amount of output, consumption, investment, and capital demand on that industry. Consumption depends on real disposable income per capita, relative prices, differential income elasticities, and population. Input productivity depends on access to inputs

because a larger choice set of inputs means it is more likely that the input with the specific characteristics required for the job will be found. In the capital stock adjustment process, investment occurs to fill the difference between optimal and actual capital stock for residential, non-residential, and equipment investment. Government spending changes are determined by changes in the population.

Block 2. Labor and Capital Demand

The Labor and Capital Demand block includes the determination of labor productivity, labor intensity, and the optimal capital stocks. Industry-specific labor productivity depends on the availability of workers with differentiated skills for the occupations used in each industry. The occupational labor supply and commuting costs determine firms' access to a specialized labor force.

Labor intensity is determined by the cost of labor relative to the other factor inputs, capital, and fuel. Demand for capital is driven by the optimal capital stock equation for both non-residential capital and equipment. Optimal capital stock for each industry depends on the relative cost of labor and capital, and the employment weighted by capital use for each industry. Employment in private industries is determined by the value added and employment per unit of value added in each industry.

Block 3. Population and Labor Supply

The Population and Labor Supply block includes detailed demographic information about the region. Population data is given for age, gender, and race, with birth and survival rates for each group. The size and labor force participation rate of each group determines the labor supply. These participation rates respond to changes in employment relative to the potential labor force and to changes in the real after-tax compensation rate. Migration includes retirement, military, international, and economic migration. Economic migration is determined by the relative real after-tax compensation rate, relative employment opportunity, and consumer access to variety.

Block 4. Compensation, Prices, and Costs

This block includes delivered prices, production costs, equipment cost, the consumption deflator, consumer prices, the price of housing, and the compensation equation. Economic geography concepts account for the productivity and price effects of access to specialized labor, goods, and services.

These prices measure the price of the industry output, taking into account the access to production locations. This access is important due to the specialization of production that takes place within each industry, and because transportation and transaction costs of distance are significant. Composite prices for each industry are then calculated based on the production costs of supplying regions, the effective distance to these regions, and the index of access to the variety of outputs in the industry relative to the access by other uses of the product.

The cost of production for each industry is determined by the cost of labor, capital, fuel, and intermediate inputs. Labor costs reflect a productivity adjustment to account for access to specialized labor, as well as underlying compensation rates. Capital costs include costs of non-residential structures and equipment, while fuel costs incorporate electricity, natural gas, and residual fuels.

The consumption deflator converts industry prices to prices for consumption commodities. For potential migrants, the consumer price is additionally calculated to include housing prices. Housing prices change from their initial level depending on changes in income and population density.

Compensation changes are due to changes in labor demand and supply conditions and changes in the national compensation rate. Changes in employment opportunities relative to the labor force and occupational demand change determine compensation rates by industry.

Block 5. Market Shares

The market shares equations measure the proportion of local and export markets that are captured by each industry. These depend on relative production costs, the estimated price elasticity of demand, and the effective distance between the home region and each of the other regions. The change in share of a specific area in any region depends on changes in its delivered price and the quantity it produces compared with the same factors for competitors in that market. The share of local and external markets then drives the exports from and imports to the home economy.

Appendix 2: Detailed Data Methodology

To properly model the impacts of the construction of MGM Springfield in REMI's PI⁺ model, the relevant data from the closeout summaries needed to be collected and adjusted for the model's use. Since all company and worker data was provided at the ZIP code level, the research team was able to aggregate the data to the model's six regions that are comprised of counties in Massachusetts (see Table 9).

More work was needed to prepare the data for the model's available variables and to adjust for its default relationships. Because PI⁺ uses headcount rather than FTEs or employed people as its concept of jobs, we used the deduplicated worker counts as the starting point for our analysis. To dedupe the workers, we created a unique ID for each worker that combined the worker's name, gender, ethnicity, and veteran status. Any workers with the same ID were considered the same person. We chose to exclude ZIP code when creating the ID in case the worker moved during the construction period, though only the first ZIP code of deduped workers was retained. The workers were aggregated to the model regions using their ZIP codes. Similarly, we also aggregated construction spending to the model regions using the contracted company's ZIP code. A small number of workers (roughly a dozen among over 4,000) had invalid ZIP codes. These workers were allocated to the same ZIP code as their employer.

PI⁺ requires inputs to be both by industry, region, and by year. We received payments for each contractor by month or quarter and thus were able to allocate the money across counties and years. However, the closeout summaries did not provide allocations of workers or compensation over time. To address this need, we allocated workers and their compensation using the same pattern as payments. For example, 9.2 percent of all payments to contractors in Hampden County occurred in 2015. Therefore, we allocated 9.2 percent of workers residing in Hampden County and their compensation to 2015 as well. The one exception to this method was for Barnstable County, which did not have any businesses receiving a contract and therefore could not provide a pattern for allocation. Here, we allocated workers and compensation evenly over the five years.

Due to existing economic linkages, PI⁺ can run a complete economic impact model just using the workers by industry, region, and year. For the purposes of this analysis, all activity was entered in the construction sector. The relevant default linkages for this analysis are average labor productivity, average compensation rate, and the typical intermediate inputs used in construction. Below, we have described what each of these linkages are, why we needed to adjust them, and how we adjusted them.

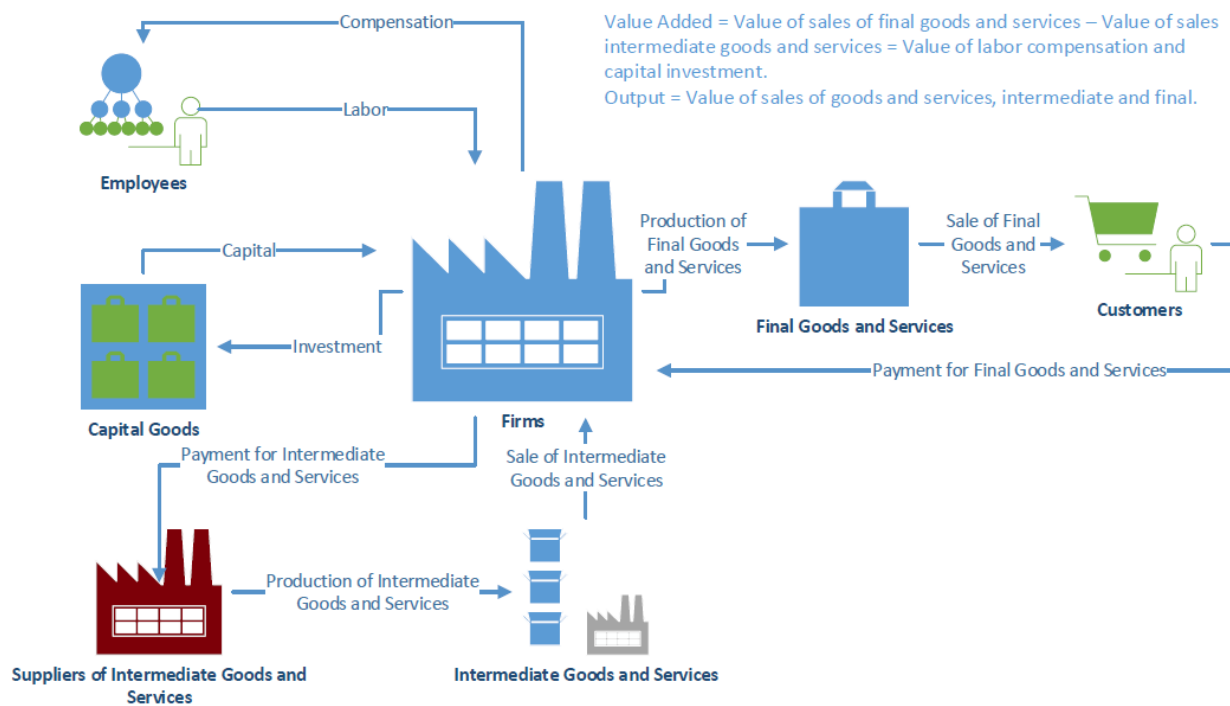
- Average labor productivity is the dollar value of production attributable to each worker (i.e., output per worker). In this context, labor productivity can be found for each contract by dividing the contract value by the number of workers used to satisfy that contract. Since we know the actual labor productivity, we overrode the model's default values. To do this, we took the difference between the output generated by the MGM construction workers and the output the model would have automatically generated. We then adjusted the output for each region by this difference so that the actual change in employment and output would match what is known of the MGM construction project.
- Average compensation rate is the total dollar value of wages, salaries, and benefits per worker. This value can be found by dividing total compensation by total workers. Similar to productivity, we know the actual values. Again, we adjusted compensation with the difference between known and expected values.
- Intermediate inputs are the goods and services purchased by one business from another to be incorporated into the first businesses goods and services. For example, the steel or accounting services purchased by an auto manufacturer are intermediate inputs to auto manufacturing. Unlike most industries, many dissimilar businesses are gathered together in construction, such

as electrical contractors, site preparation, and demolition. Normally, this collection of businesses is beneficial to the modeler as he or she must only know the total construction value without needing to know the actual distribution of budget between contractors. Since we know the distribution of contractors, we nullified the model's response and inputted our own values.

Appendix 3: Output versus Value Added

For any firm to produce goods and services to be sold on the market, it needs to pay for the things required to produce them. It needs to compensate workers for their labor, and it needs to invest in the capital goods (machinery, for example) which those workers will use. It also needs to purchase intermediate goods and services from other firms. Workers then use the firm’s capital goods to turn the intermediate goods and services into final goods and services. These are the output of the firm and are equivalent to the value of its sales.

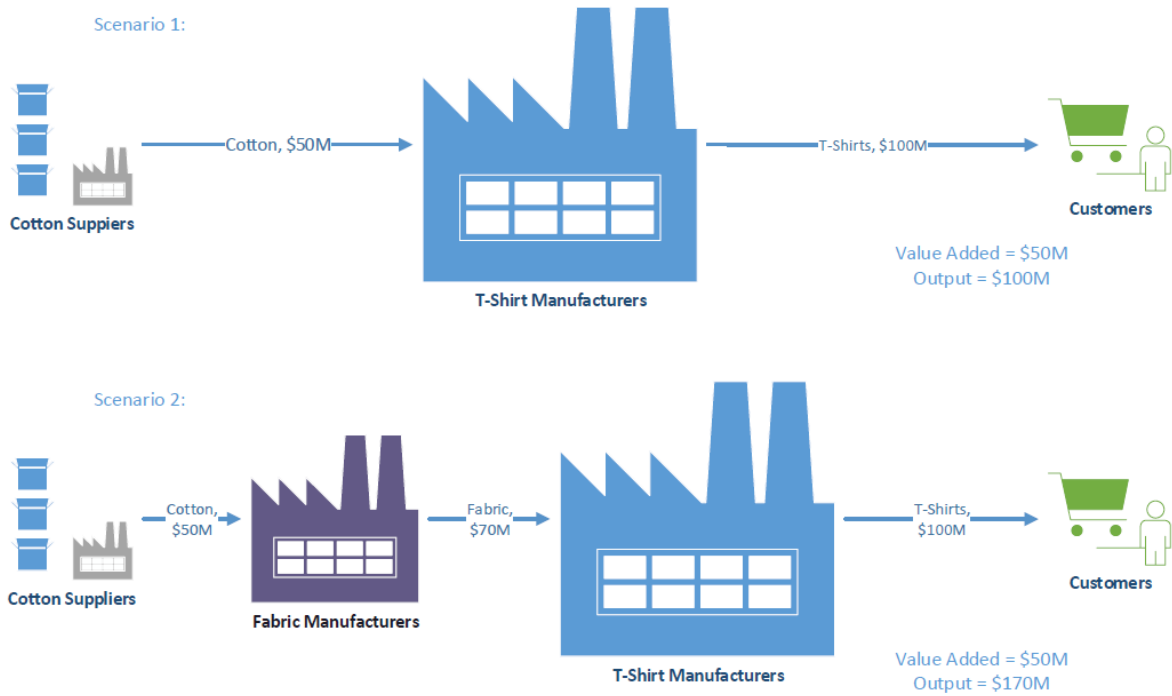
The concept of **value added** captures only the portion of the output which is directly created by the firm’s capital goods and labor. In other words, value added is the value of the final goods and services produced minus the value of the intermediate goods and services which were purchased to produce them. This can be interesting when examining an individual firm, since two firms can have similar outputs but very different value added, depending on the cost of their intermediate inputs.



Consider the example of two different t-shirt manufacturers whose economic impact on a region is being evaluated. Both of the manufacturers ultimately sell \$100 million in t-shirts, and in order to produce them, both manufacturers use \$50 million in cotton. However, the structure of their supply chains is different. One of the firms takes the cotton and performs every step required to turn the cotton into t-shirts at its facility. For this firm, value added is \$50 million (\$100 million in t-shirts minus \$50 million in cotton) and output is \$100 million. The other manufacturer instead opts to purchase fabric from a third party fabric manufacturer, which has taken the \$50 million in cotton and turned it into \$70 million in fabric. When considering the economic impact of this operation, both firms need to be considered. The fabric manufacturer has a value added of \$20 million (\$70 million in fabric minus \$50 million in cotton) and an output of \$70 million. The t-shirt manufacturer has a value added of \$30 million (\$100 million in t-shirts minus \$70 million in fabric) and an output of \$100 million, the same as the original factory. Considered together, this second scenario has a combined value added of \$50

million, the same as the first example, but a combined output of \$170 million, much higher than the initial example. The lesson from this is that while output is a useful economic metric in many contexts, it has the potential to double count the production of goods and services and is best when presented alongside value added for context.

Example: How change in supply chains can change output without changing value added



Appendix 4: Note on the Data Vintage Used in This Study

The groundwork for this study began early in the construction of MGM Springfield with meetings between the SEIGMA research team, MGM Springfield, and the Massachusetts Gaming Commission (MGC). These meetings set expectations for SEIGMA's data needs and MGM's data deliveries. Since each construction project is unique, these expectations must satisfy both the needs of the research agenda and the management framework used by the casino operator to oversee the construction. The optimal solution in this case was for MGM Springfield to provide SEIGMA with a closeout statement at the end of each contract. These statements were audited and notarized records and therefore often came months after the activity related to the contract was completed.

In January of 2019, SEIGMA, MGM, and the MGC met to discuss the timeframe for this project. In the interests of balancing the accuracy of the data with the Commission's and the public's desire to see the results of the study, the group decided that MGM should provide draft closeout statements to the SEIGMA research team going forward rather than waiting months for all audits and notarizations to be completed.

As a result of utilizing some draft data, this study is a snapshot of the construction data as known to the SEIGMA team in March of 2019. Since that time, MGM has finalized the closeout statements used in this project and will have made some corrections. In the preparation of this report, MGM Springfield and SEIGMA research team have reconciled the snapshot of March 2019 with the snapshot of September 2019 and found only small differences. In no instance were the differences greater than low single-digit percentages and they did not materially change our findings. The use of different snapshots is also responsible for the small differences in the data reported here compared to MGM Springfield's own reports to the MGC.